Shock Hazard Prevention through Self-Healing Insulative Coating on SSA Metallic Bearings, Phase II

Completed Technology Project (2015 - 2017)

Project Introduction

The space suit assembly (SSA) contains metallic bearings at the wrist, neck, and waist, which are exposed to space environment, and pose a potential shock hazard. Current methods to mitigate the hazard are short-term, and there is a need for an insulative and durable coating on the metallic components. In Phase I, working with a supplier of space suits to NASA, we demonstrated proof-of-concept of a novel Self-Healing Coating (SHC) system which is highly insulative and is capable of healing surface damages at ambient conditions. The three-layered self-healing coating was applied on flat panels of stainless steel, titanium and aluminum. In addition to self-healing, the ability of the coating to resist impact damage was demonstrated. Building upon the successful Phase I demonstration, the focus of the Phase II effort will be to further test and optimize the SHC system and implement on a prototype metallic bearing. The Phase II objectives include: (i) ensuring that the self-healing coating system can be used in space environment; (ii) determining the least coating thickness that will provide both self-healing and electrical resistance; (iii) developing a suitable process for depositing the coating on components of different geometries; and (iv) developing a property and performance data set that best predicts useful life of the coating. Successful development will culminate in applying the SHC system on a prototype component and performing the needed qualification testing. We anticipate achieving a TRL of 6 by the end of the Phase II program. The work plan includes preparing coating solutions and coating flat test panels; conducting performance tests and optimizing coating thickness using coated plates; qualifying the SHC system for use in a space environment; developing a property and performance data set that best predicts useful life of the coating; applying SHC system to a prototype hardware; and evaluating performance of coating on prototype hardware.

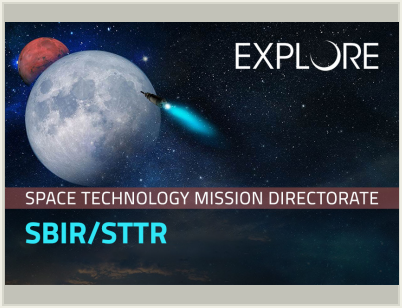

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Table of Contents

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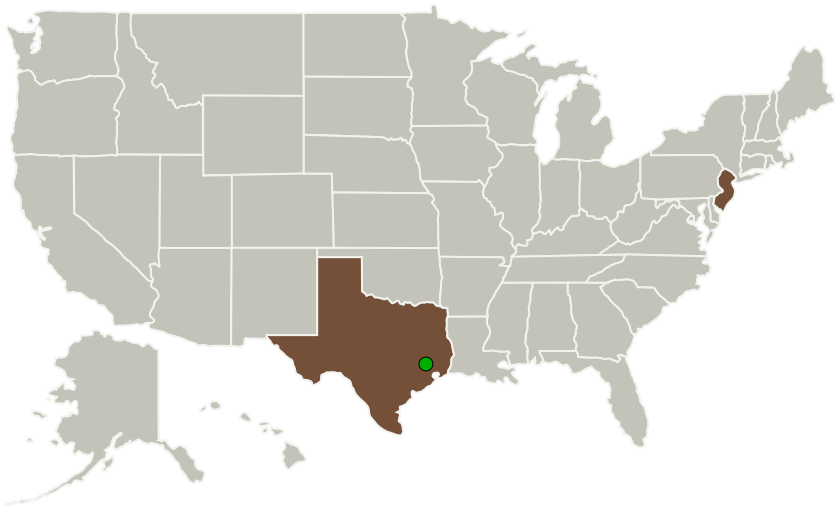
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
NEI Corporation	Lead Organization	Industry Small Disadvantaged Business (SDB)	Piscataway, New Jersey
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
New Jersey	Texas

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

NEI Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Runqing Ou

Co-Investigator:

Runqing Ou

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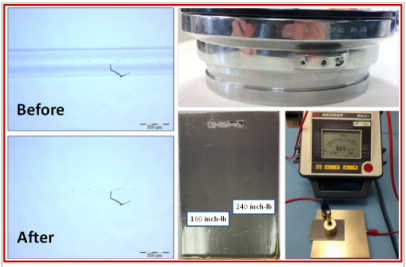
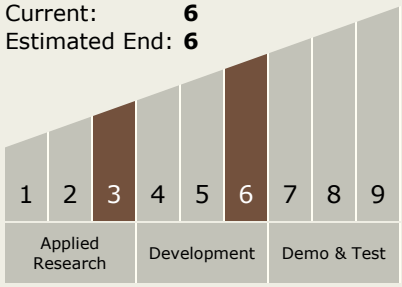
Images



Briefing Chart
Shock Hazard Prevention through Self-Healing Insulative Coating on SSA Metallic Bearings Briefing Chart
(https://techport.nasa.gov/image/129576)

Technology Maturity (TRL)

Start: **3**
Current: **6**
Estimated End: **6**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.2 Extravehicular Activity Systems
    - TX06.2.1 Pressure Garment

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System